

on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

For fuller details see Monthly Bulletin of the River and Flood Service for July, 1898.—*F. W. Krichelt.*

Heights of rivers referred to zeros of gauges, July, 1898.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
<i>Mississippi River.</i>	<i>Miles.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>
St. Paul, Minn.	1,937	14	6.9	13	3.9	29,30	5.1	3.0
Reeds Landing, Minn.	1,887	12	4.1	1-3	2.0	31	3.4	2.1
La Crosse, Wis.	1,822	12	5.9	1	3.1	31	4.6	2.8
North McGregor, Iowa.	1,762	18	7.1	1	2.8	31	4.6	4.3
Dubuque, Iowa	1,702	15	7.2	1	2.8	31	4.6	4.4
LeClaire, Iowa	1,612	10	5.2	1	1.6	31	3.2	3.6
Davenport, Iowa	1,596	15	6.7	1	2.8	30,31	4.2	3.3
Galland, Iowa	1,475	8	4.8	1	1.5	31	2.4	2.7
Keokuk, Iowa	1,466	14	7.2	1	2.3	31	4.0	4.9
Hannibal, Mo.	1,405	17	8.5	1	3.8	31	5.4	4.7
St. Louis, Mo.	1,307	23	12.5	1	5.3	24,25	8.0	7.2
Chester, Ill.	1,264	30	23.2	1,2	10.7	29,30	16.4	13.5
Cairo, Ill.	1,189	30	18.2	2	7.8	30	12.9	10.4
Memphis, Tenn.	1,073	45	25.4	2	12.5	27	18.7	12.9
Helena, Ark.	843	33	18.2	4,5	7.7	29	13.3	10.5
Kansas City, Ark.	767	42	26.2	6	12.5	30	30.3	18.7
Greenville, Miss.	695	42	28.3	8	14.5	28	22.3	13.8
Vicksburg, Miss.	595	42	23.1	8	11.6	29	18.4	11.5
New Orleans, La.	474	45	27.0	1	13.4	31	21.8	13.6
Arkansas River.	108	16	10.5	1	4.5	31	7.7	6.0
Wichita, Kans.	730	10	3.4	1	7.6	25,29	2.2	1.8
Fort Smith, Ark.	345	22	11.8	2	4.1	22	7.0	7.7
Dardanelle, Ark.	250	21	12.0	26	4.3	24	7.2	7.7
Little Rock, Ark.	170	23	12.5	4,5	5.8	25	8.9	6.7
White River.								
Newport, Ark.	150	26	6.7	26	3.6	19	4.8	3.1
Des Moines River.								
Des Moines, Iowa	150	19	3.8	1-4	2.8	24-28 30,31	3.2	1.0
Illinois River.								
Peoria, Ill.	135	14	9.1	1	3.5	24	5.5	5.6
Missouri River.								
Blismarck, N. Dak.	1,201	14	10.8	1	5.5	31	7.8	5.3
Pierre, S. Dak.	1,006	14	10.4	1	5.6	31	7.6	4.8
Sioux City, Iowa	676	19	14.7	1,2	10.1	31	12.3	4.6
Omaha, Nebr.	561	18	14.7	3	10.6	31	12.2	4.1
St. Joseph, Mo.	373	10	10.2	4	5.6	27,28	7.7	4.6
Kansas City, Mo.	280	21	19.7	5	11.9	28	15.5	7.8
Boonville, Mo.	191	20	16.9	1	10.2	29,30	13.5	6.7
Hermann, Mo.	95	24	17.2	1	9.8	31	13.3	7.4
Ohio River.								
Pittsburg, Pa.	966	22	6.5	20	5.0	8	5.7	1.5
Davis Island Dam, Pa.	960	25	5.5	1	2.0	17	3.1	3.5
Wheeling, W. Va.	875	36	5.5	2	1.7	15,20	3.1	2.7
Parkersburg, W. Va.	785	36	7.0	3	2.8	16	4.7	4.2
Point Pleasant, W. Va.	708	39	5.6	30	2.1	15,17	3.5	3.5
Catlettsburg, Ky.	651	50	8.4	31	3.3	15,16	5.5	5.1
Portsmouth, Ohio	612	50	9.6	27	4.2	15	6.7	5.4
Cincinnati, Ohio	499	50	11.0	27	6.1	17	8.6	4.9
Louisville, Ky.	367	28	6.0	29-31	3.8	17,18	5.0	2.2
Evansville, Ind.	184	35	11.2	1	4.4	20,21	6.4	6.8
Paducah, Ky.	47	40	12.3	1,2	3.5	22	7.0	8.8
Allegheny River.								
Warren, Pa.	177	7	2.0	1	0.0	24-27	0.6	2.0
Oil City, Pa.	123	13	3.0	1	0.5	18-26	1.0	2.5
Parkers Landing, Pa.	73	20	2.5	1	0.3	24,25	0.9	2.2
Freeport, Pa.	26	20	5.0	1	0.8	18,19	1.6	4.2
Conemaugh River.								
Johnstown, Pa.	64	7	1.7	2	0.8	14,15,17	1.2	0.9
Red Bank Creek.								
Brookville, Pa.	35	8	0.8	1	0.2	13	0.8	0.6
Beaver River.								
Ellwood Junction, Pa.	10	14	2.0	25	-1.5	24	-0.4	3.5
Cumberland River.								
Burnside, Ky.	434	50	4.8	30	-0.1	14,15	1.1	4.9
Carthage, Tenn.	257	30	5.0	30	0.8	16-19	1.7	4.2
Nashville, Tenn.	175	40	7.2	27,28	1.5	14	33.0	6.7
Great Kanawha River.								
Charleston, W. Va.	61	30	7.6	30	6.2	14-17	6.8	1.4
New River.								
Hinton, W. Va.	95	14	3.1	29	1.0	14	1.7	2.1
Licking River.								
Falmouth, Ky.	30	25	6.0	26	1.1	14-16	2.5	4.9
Miami River.								
Dayton, Ohio	69	18	1.9	27,28	1.1	2,3,14,15	1.5	0.8
Monongahela River.								
Weston, W. Va.	161	18	0.6	21	-1.0	(3-5, 8-13) 15,16	-0.5	1.6
Fairmont, W. Va.	119	25	1.8	20	-0.3	15-17	0.7	2.1
Greensboro, Pa.	81	18	8.0	19	6.3	14	7.1	1.7
Lock No. 4, Pa.	40	28	9.7	20	6.8	18	8.3	2.9
Cheat River.								
Rowlesburg, W. Va.	36	14	5.0	19	0.5	13-16	1.8	4.5

Heights of rivers referred to zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
<i>Youghiogheny River.</i>	<i>Miles.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>
Confuence, Pa.	59	10	4.0	18	0.9	13, 14	1.7	3.1
West Newton, Pa.	15	25	3.0	19	0.0	10-15, 29	0.4	3.0
<i>Muskingum River.</i>								
Zanesville, Ohio	70	20	8.5	28	6.0	7-10	7.1	2.5
<i>Tennessee River.</i>								
Knoxville, Tenn.	614	29						
Kingston, Tenn.	534	25	4.2	31	0.4	8	1.4	3.8
Chattanooga, Tenn.	430	33	7.7	31	2.1	4	3.6	5.6
Bridgeport, Ala.	390	24	4.3	31	0.8	5, 7, 8	1.9	3.5
Florence, Ala.	220	16	3.8	41	0.7	7-11	1.5	3.1
Johnsonville, Tenn.	94	21	4.6	30, 31	1.4	16	2.7	3.2
<i>Clinch River.</i>								
Speers Ferry, Va.	156	20	5.0	28	0.3	3	1.2	4.7
Clinton, Tenn.	46	25	12.5	30	3.8	17, 20	5.5	8.7
<i>Wabash River.</i>								
Mount Carmel, Ill.	50	15	3.0	1-6	1.6	29-31	2.5	1.4
<i>Red River.</i>								
Arthur City, Tex.	688	27	11.4	1	5.3	16	7.0	6.1
Fulton, Ark.	565	28	13.2	1	4.7	30	6.9	8.5
Shreveport, La.	449	29	11.6	3, 4	5.0	31	8.4	6.0
Alexandria, La.	139	33	12.1	2	4.7	30, 31	8.3	7.4
<i>Atchafalaya Bayou.</i>								
Melville, La.	100*	31	26.4	1	16.6	31	22.8	9.8
<i>Ouachita River.</i>								
Camden, Ark.	340	39	6.3	2	4.2	21	5.1	2.1
Monroe, La.	100	40	12.8	1	2.2	24	6.1	10.6
<i>Yazoo River.</i>								
Yazoo City, Miss.	80	25	5.2	10	1.8	27, 28	2.9	3.4
<i>Chattahoochee River.</i>								
Columbus, Ga.	140	20	9.0	31	-0.7	4-6	2.9	9.7
<i>Flint River.</i>								
Albany, Ga.	80	20	4.6	18, 19	2.4	9, 10, 12, 30	3.3	2.2
<i>Cape Fear River.</i>								
Fayetteville, N. C.	100	38	16.2	8	1.0	5	5.9	15.2
<i>Columbia River.</i>								
Umatilla, Oreg.	270	25	18.8	1	12.0	31	15.2	6.8
The Dalles, Oreg.	166	40	31.9	1	19.1	31	24.7	12.8
<i>Willamette River.</i>								
Albany, Oreg.	99	20	2.0	1-3	1.0	16-31	1.4	1.0
Portland, Oreg.	10	15	18.0	1	10.0	30, 31	13.2	8.0
<i>Edisto River.</i>								
Edisto, S. C.	75	6	4.9	16	0.4	3, 4	2.9	4.5
<i>James River.</i>								
Lynchburg, Va.	257	18	1.6	29	0.0	6, 13, 15, 16	0.6	1.6
Richmond, Va.	110	12	2.8	28	-0.2	5, 14-17	0.4	3.0
<i>Alabama River.</i>								
Montgomery, Ala.	265	35	4.2	16, 17, 31	-0.3	4-8	1.7	4.5
Selma, Ala.	212	35	5.4	18	-0.9	7, 8	1.8	6.3
<i>Coosa River.</i>								
Rome, Ga.	225	30	4.2	29, 31	1.0	2-5	2.3	3.1
Gadsden, Ala.	144	18	4.8	31	-0.3	5-8	1.2	5.1
<i>Tombigbee River.</i>								
Columbus, Miss.	285	33	-0.2	25	-2.6	15	-1.7	2.4
Demopolis, Ala.	155	35	2.4	29, 31	-1.2	15	0.1	3.6
<i>Black Warrior River.</i>								
Tuscaloosa, Ala.	90	38	2.9	31	-0.2	17	0.8	3.1
<i>Pedee River.</i>								
Cheraw, S. C.	145	27	8.0	8	0.4	5	2.5	7.6
<i>Black River.</i>								
Kingstree, S. C.	60	12	7.3	20	3.6	8	5.7	3.7
<i>Lumber River.</i>								
Fairbluff, N. C.	10	6	2.3	20	-0.6	6-8	0.7	2.9
<i>Lynch Creek.</i>								
Effingham, S. C.	35	12	7.9	15	2.1	5, 6	4.1	5.8
<i>Polomac River.</i>								
Harpers Ferry, W. Va.	170	16	2.6	31	0.4	19-21	0.9	2.2
<i>Roanoke River.</i>								
Clarksburg, Va.	155	12	2.4	29, 30	0.0	4, 5	0.9	2.4
<i>Sacramento River.</i>								
Red Bluff, Cal.	241	23	0.1	1-3	-0.6	28-31	0.2	0.7
Sacramento, Cal.	70	25	8.8	1, 2	7.6	23-31	8.0	1.2
<i>Santee River.</i>								
St. Stephens, S. C.	50	12	7.1	14-20	-1.3	8	4.4	8.4
<i>Congaree River.</i>								
Columbia, S. C.	37	15	8.8	13	1.0	2-4	2.3	2.8
<i>Warehite River.</i>								
Camden, S. C.	45	24	15.5	8	0.9	5	6.4	14.6
<i>Savannah River.</i>								
Augusta, Ga.	130	32	17.7	25	3.3	6	9.6	14.4
<i>Susquehanna River.</i>								
Wilkesbarre, Pa.	178	14	0.0	1-8	-0.4	18-30	-0.2	0.4
Harrisburg, Pa.	70	17	2.2	2	0.7	18, 19	1.2	1.7
<i>Juniata River.</i>								
Huntingdon, Pa.	80	24	3.3	29	2.8	7-26	2.9	0.1
<i>W. Br. of Susquehanna.</i>								
Williamsport, Pa.	35	20	2.0	1	0.5	17-20	0.9	1.1
<i>Waccamaw River.</i>								
Conway, S. C.	40	7	2.5	13-14	0.5	1	1.7	2.0

values in the tables have been generalized in a number of cases, the results appearing on Charts Nos. III to VII, inclusive.

PRESSURE AND WIND.

Normal conditions.—The geographic distribution of normal barometric readings at sea level and under local gravity for July is shown by Chart V of the MONTHLY WEATHER REVIEW for July, 1893.

Normal pressure in July is highest over the south Atlantic and north Pacific coasts and lowest over Arizona and the Plateau region. As compared with June there is a very general increase, especially in southern latitudes and along the eastern foothills of the Rocky Mountains.

Normal pressure on the south Atlantic coast and over the interior of the continent increases steadily from July to January when the characteristic winter distribution is fully developed.

The prevailing winds, except on the Pacific coast, are generally from a southerly quarter—southwesterly in New England and the lower Lake region, southerly in the Mississippi Valley and on the south Atlantic and Gulf coasts, and southeasterly on the Plains. On the Pacific coast the general tendency is to blow from some westerly quarter.

The current month.—The distribution of monthly mean pressure, as shown by Chart IV, presents no unusual features. Pressure was above normal in New England, the Middle and South Atlantic States, the Lake region, Ohio Valley and Tennessee, the upper Mississippi Valley, North Dakota, and the middle Plateau; elsewhere it was generally below normal, although there were no marked departures in any district.

The changes from June to July were large over New England, the Lake region, the middle Mississippi Valley, and the lower Missouri Valley. Pressure has steadily increased over New England and the Lake region since May last.

The prevailing winds on the Atlantic coast were southerly or southwesterly, except on the Florida peninsula, where southeasterly winds prevailed. In the west Gulf States, upper Mississippi and Missouri Valleys, southerly or southeasterly winds were most frequent. Northerly and northwesterly winds prevailed on the Pacific coast and the upper Lakes; elsewhere the winds were generally from a southerly quarter.

TEMPERATURE OF THE AIR.

Normal conditions.—The normal mean temperature of the air in the United States in July varies from about 84° at Key West, 82° at Jacksonville, 82° at New Orleans, 84° at Galveston, 67° at San Diego, to 60° at Eastport, 71° at Burlington, 70° at Buffalo, 72° at Detroit, 66° at Duluth, 66° at St. Vincent, 67° at Havre, 69° at Spokane, and 63° at Seattle, on Puget Sound. The warmest regions are the lower Rio Grande Valley and southwestern Arizona, including a portion of the desert region of California. The seacoast is cooler than the interior on corresponding parallels. The coldest portion of the United States is the region about Lake Superior.

In studying the distribution of monthly mean temperatures it will be found very helpful to consult the charts at the end of this REVIEW, especially No. VI, Surface Temperatures, Maximum, Minimum, and Mean. This chart gives a very good idea of the variations of temperature with latitude and longitude, and also of the distribution of normal surface temperatures. Chart VI for any month will differ from a normal chart merely in the displacement or bending of the isotherms northward or southward according as the temperature of the particular locality is above or below the normal for the place and season.

The current month.—The month had several features that

deserve mention; first was the period of high temperature extending from the 1st to the 5th; second, the low temperature and frost in New York, northern New England, northern Ohio, and the northern part of the lower peninsula of Michigan, and, finally, the great range of temperature during the month.

Unusually high temperature prevailed over the region extending from the Lakes eastward and southeastward to the Atlantic from the 1st to the 5th. The thermometer readings at Washington, Baltimore, Philadelphia, New York, Albany, Portland, and Eastport were as high or higher than have been registered in the first ten days of July during the last twenty-seven years, and many other stations reported temperatures within a few degrees of the highest ever before recorded. The air was relatively dry during the hot spell and there was not so much suffering as might have been the case. The casualties due to excessive heat were greatest on July 1, on which date, according to press reports, there were 2 deaths and 36 prostrations in New York City; 3 deaths and 16 prostrations in Chicago, with a few scattered cases elsewhere. Cooler weather prevailed in the Lake region on the 3d, and by the morning of the 5th lower temperatures prevailed eastward to the coast.

While the temperature was abnormally high in the region above mentioned, the weather on the north Pacific coast was unusually cold for the season. The highest point reached by the thermometer during the first ten days of the month at Eureka, Cal., was 58°; Fort Canby and Port Angeles, Wash., 68°; San Diego, Cal., 73°; Portland, Oreg., 83°, and San Francisco, Cal., 88°. The temperature of the northern slope and the northern plateau was also much below the normal. During the first week of July the daily mean temperature was 12° below the normal at Helena and a less amount at other stations in that region.

The lowest temperature of the month in the lower Lake region, the Ohio Valley, the Middle Atlantic States, and New England was recorded on the 10th, 11th, and 12th. Frost severe enough to kill corn and vegetables, a very unusual occurrence during July, was observed on the upper portion of the lower peninsula of Michigan, the northern part of Ohio, western New York, northern New England, and in portions of New Jersey. The minimum temperature at a few places in the above named territory was lower than ever before recorded during the first ten days of July. Low temperature for the season prevailed southward to the Gulf. At Washington, D. C., a minimum of 54° was recorded on the 11th, 53° being the lowest recorded in July during the last twenty-seven years. At Baltimore the minimum temperature fell to within 2° of the lowest ever before recorded in July.

The monthly range of temperature in the Lake region and the Middle Atlantic States was unusually large, as may be seen by an inspection of the data in Table I.

The close of the month on both the eastern and western coasts was marked by a period of warm weather. On the eastern coast the thermometer readings were not unusually high, but there was sufficient moisture in the air to produce more or less bodily discomfort. The relative humidity on the first and last four days of the month, respectively, is exhibited in the following table:

Relative humidity at Washington, Philadelphia, and New York.

	July.									
	1st.	2d.	3d.	4th.	Mean.	28th.	29th.	30th.	31st.	Mean.
Washington.....	63	62	56	72	63	92	78	69	75	78
Philadelphia	60	58	58	75	63	81	80	67	79	77
New York.....	54	63	63	84	66	97	89	87	87	90

A few prostrations were reported in the Lake region on the 15th, 17th, 18th, 19th, 24th, 25th, and on the eastern seaboard on the 21st and 29th.

Three casualties due to excessively hot weather were reported from Arizona on the 28th (Arizona Gazette, July 30, 1898). The latter are of more than passing interest. The temperature and humidity at Phenix, where the fatalities occurred, were as follows: July 28, maximum temperature, 110°; minimum, 85°; relative humidity, 5 a. m., local time, 42 per cent; 5 p. m., 17 per cent.

The temperature of the month as a whole was 1° to 4° above the average in the Lake region, New England (except the Maine coast), the Ohio Valley and Tennessee, the upper Mississippi and Missouri valleys. It was also slightly above the average over the greater part of the Plateau region. Elsewhere temperature was normal or below, but generally the deficits were small.

The average temperatures of the respective geographic districts, the departures from the normal of the current month and from the general mean since the first of the year, are presented in the table below for convenience of reference:

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	10	68.4	+ 0.2	+ 7.3	+ 1.0
Middle Atlantic	12	76.3	+ 1.7	+10.3	+ 1.5
South Atlantic	10	80.0	+ 0.1	+ 6.1	+ 0.9
Florida Peninsula	7	81.7	+ 0.2	+26.0	+ 0.4
East Gulf	7	80.5	- 0.6	+ 4.3	+ 0.6
West Gulf	7	81.6	- 0.3	+10.2	+ 1.5
Ohio Valley and Tennessee	12	78.1	+ 1.3	+12.7	+ 1.8
Lower Lake	8	73.4	+ 2.2	+19.5	+ 2.8
Upper Lake	9	68.6	+ 1.3	+20.7	+ 3.0
North Dakota	7	67.8	- 0.7	+22.4	+ 3.2
Upper Mississippi	11	75.4	+ 0.2	+17.3	+ 2.5
Missouri Valley	10	75.0	- 0.3	+19.1	+ 2.7
Northern Slope	7	69.0	- 0.6	+ 7.5	+ 1.1
Middle Slope	6	76.1	- 0.4	+ 8.8	+ 1.3
Southern Slope	5	78.3	- 1.9	+ 6.5	+ 0.9
Southern Plateau	13	79.5	0.0	- 0.7	- 0.1
Middle Plateau	9	73.1	+ 1.0	- 6.0	- 0.9
Northern Plateau	11	69.5	+ 0.1	+ 5.2	+ 0.7
North Pacific	9	62.0	+ 0.4	+ 5.7	+ 0.8
Middle Pacific	5	64.1	- 0.3	- 4.6	- 0.7
South Pacific	4	71.4	+ 0.7	+ 0.9	+ 0.1

The distribution of the observed monthly mean temperature of the air is shown by red lines (isotherms) on Chart VI. This chart also shows the maximum and the minimum temperatures, the former by broken and the latter by dotted lines. As will be noticed, these lines have been drawn over the Rocky Mountain Plateau region, although the temperatures have not been reduced to sea level; the isotherms relate, therefore, to the average surface of the country in the neighborhood of the various observers, and as such must differ greatly from the sea-level isotherms of Chart IV.

In Canada.—Prof. R. F. Stupart says:

The mean temperature of the month was either equal to or above average in all parts of the Dominion, except the central and more southern portions of Assiniboia. The greatest excess above occurred in Ontario, east of the Georgian Bay and Lake Huron, and north of Lake Ontario, where at some points it was as much as 6°. A marked feature of the month was the unusually large range of temperature; thermometer readings of 90° and upward were recorded at least once in every province, except Prince Edward Island and perhaps Vancouver Island, while, on the other hand, on the 11th in Ontario and on the 20th in Manitoba and the Northwest Territories, ground frosts occurred very generally, and at some few points in Ontario temperatures below 32° were recorded by thermometers four feet above the ground.

PRECIPITATION.

Normal conditions.—The regions of heavy precipitation, 4 to 6 inches in July, are mainly on the Gulf and south Atlantic

coasts. There are, however, other areas, in various parts of the interior, which have, according to the present normal charts, an average precipitation of 4 inches and over. Some of these areas, doubtless, appear on the charts as a result of the practice of including months of torrential rains in the general sums and averages of a short series of observations. Their present boundaries are, therefore, uncertain.

There is, undoubtedly, a greater tendency to heavy downpours in some localities than in others, but it is difficult at present to delimit the precise areas thus liable to excessive precipitation.

The rainfall of the Pacific coast in July is at its yearly minimum, and summer rains have begun in Arizona and New Mexico.

The region eastward of the one hundredth meridian has a variable summer rainfall. In some part of the territory there is each year total or partial drought. Happily, however, much of the region has an average rainfall in excess of the actual needs of agriculture.

The current month.—More than the average amount of rain fell in 6 out of the 21 districts into which the country has been divided; the fall in 9 was below normal, while in the remaining 6 it was practically normal. On the whole, the month must be classed as one of average rainfall. In the majority of districts where the fall was below normal the deficits were small and no injurious results followed. As frequently happens in July, torrential rains fell in a number of States; in some cases considerable loss of life resulted. The greatest floods occurred in Missouri, there being two localities in which the fall was unusually heavy. On the night of the 6-7th, in Atchison, Nodoway, Holt, and Gentry counties, remarkably heavy rains fell, causing the small streams and rivers to leave their banks, washing away bridges, fences, and growing crops, and also causing great loss to livestock. Various estimates of the damage done were made at the time. In some cases it was placed as high as \$300,000; probably half that sum would be nearer the truth. There was no rain gauge in the midst of the greatest downpour. Outlying measurements were as follows: The gauge at Thurman, Iowa, caught 9.70 inches in eight hours and fifty minutes; the Pickering, Mo., gauge caught 8.15 inches of rain in twenty-four hours; at Maryville, about the center of Nodoway County, 6.84 inches were caught. The greatest downpour occurred between 7 p. m. of the 6th and about 2 a. m. of the 7th. Six people were drowned in the floods.

On the night of the 7-8th heavy rain set in at St. Louis, 5.08 inches falling in twenty-four hours, 2.86 of which fell in one hour and two minutes. The cellars and basements in badly drained sections of the city were flooded; damages to the amount of \$30,000 were reported to the police. A line of street railway operated by electricity was interrupted by a pool of water forming over a depressed portion of the tracks. The most serious loss of human life occurred at Steelville, in Crawford County, on the early morning of the 8th. Rains had fallen during the day, and set in again at night. The town lies in a valley not more than 300 yards wide, through the center of which Yadkin Creek runs. The inhabitants of the village were suddenly awakened about 3 o'clock in the morning by a flood of water which soon crept up to the second stories of the dwelling houses. In a very short time thirty-five buildings were washed away and many others were badly wrecked. Thirteen people were drowned in the flood. Property loss was estimated at \$200,000.

Torrential rains fell in other States, as may be seen by Table XI, but in no other case was there so great destruction of life and property as above noted.

The drought in Florida referred to in previous REVIEWS was effectually broken.

The geographic distribution of precipitation is shown on

Chart III, and the numerical values for about 3,000 stations appear in Tables II and III, while the details as to excessive rains will be found in Table XI.

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		<i>Inches.</i>		<i>Inches.</i>	<i>Inches.</i>
New England	10	3.73	112	+0.40	+ 2.60
Middle Atlantic.....	12	4.31	100	0.00	+ 2.70
South Atlantic.....	10	8.06	127	+1.70	+ 8.10
Florida Peninsula.....	7	8.31	124	+1.60	+10.40
East Gulf.....	7	6.25	105	+0.30	+12.60
West Gulf.....	7	2.14	70	-0.30	- 3.00
Ohio Valley and Tennessee.....	12	4.01	100	0.00	- 0.10
Lower Lake.....	8	2.66	87	-0.40	- 1.00
Upper Lake.....	9	1.88	63	-1.10	- 1.20
North Dakota.....	7	2.49	89	-0.30	- 1.10
Upper Mississippi.....	11	3.26	89	-0.40	+ 3.30
Missouri Valley.....	10	4.16	102	+0.10	+ 3.30
Northern Slope.....	7	1.51	88	-0.20	+ 0.10
Middle Slope.....	6	2.77	97	-0.10	+ 3.20
Southern Slope.....	6	2.76	117	+0.40	- 1.30
Southern Plateau.....	13	1.77	95	-0.10	- 0.30
Middle Plateau.....	9	0.23	43	-0.30	- 1.20
Northern Plateau.....	11	0.40	80	-0.10	- 2.50
North Pacific.....	9	0.43	52	-0.40	- 5.20
Middle Pacific.....	5	T.	00	-0.10	- 8.20
South Pacific.....	4	0.02	100	0.00	- 5.10

In Canada.—Professor Stupart says:

Over the greater portion of Ontario the rainfall was, to a marked degree, deficient, and this was particularly the case between Lakes Ontario and Huron, where it was but a small fraction of the average amount. In counties bordering on the Ottawa the deficiency was not nearly so great in some small districts, notably near Stratford, where heavy rain fell locally during thunderstorms on the 3d, 18th, and 19th. Between Algoma and western Manitoba an average amount fell in most localities, and even a larger amount in some few districts; but west of this again, in the Territories and British Columbia, with the exception of southern Alberta, there was a pretty general deficiency, the rainfall ranging between the average amount and 50 per cent of it. In the upper St. Lawrence Valley and eastern Quebec, and in nearly all parts of the Maritime Provinces it was fully up to the average, districts in western New Brunswick and Cape Breton alone showing a small deficiency.

SNOWFALL.

A measurable amount of snow was recorded at two stations in Montana on the 1st. Snow was general on the mountain ranges of the State on that date.

HAILSTORMS.

The following account of severe hailstorms has been compiled from press dispatches, reports of Climate and Crop section directors, and the statements of regular and voluntary observers:

3d-4th.—The period of unusually high temperature over the Lake region and the Middle Atlantic States during the first part of the month was brought to a close by a series of thunderstorms, in some cases attended by large hail. A loss of \$4,000 (\$1,500 due to hail and \$2,500 to wind) was reported from Detroit. On the 4th Carnation Township, Lancaster County, Pa., was visited by an extraordinary hailstorm. The track of the storm was from a quarter to a half mile wide and about 8 miles long. Reliable reports say that after the storm hail covered the ground like snow in winter. On the farms of Milton Yohn and Isabella Baxter there were ridges of hail in the grain fields 2 feet deep. Crops, vegetables, and fruits were utterly ruined. The property loss will probably exceed \$20,000.

10th.—Press dispatches report the loss of 2,000 acres of wheat in Springhollow, 7 miles east of Pendleton, Oreg., as a result of heavy hail.

14th.—A hailstorm lasting forty minutes visited Salida, Colo. Small fruits and gardens suffered severely.

28th.—Chicago, Ill., was visited by a violent storm of wind,

rain, and hail about 6 p. m. The hail was not general throughout the city, but seemed to be concentrated in a rather narrow path through the business portion. The largest hailstones weighed 11 ounces. The impact of the stones, driven as they were by a 40-mile wind, was very destructive. A conservative estimate of the damage to property by wind and hail places the amount at \$250,000. A number of persons were injured by runaways, of which there were several hundred. The Weather Bureau anemometer was pelted severely, 30 indentations on the cups being counted after the storm. Plate glass in show windows was not, as a rule, injured. Window glass, especially in down-town streets, suffered severely, the south side of buildings receiving the greatest injury.

A severe hailstorm occurred 6 miles east of Sycamore, Ill., on the same date as the above.

29th.—Autrain, Mich., was visited by a hailstorm, said to have been the most severe ever experienced.

30th.—Severe thunderstorms, accompanied in some cases by hail, swept over Connecticut.

The following are the dates on which hail fell in the respective States:

Alabama, 3, 14. Arizona, 14, 15, 23. Arkansas, 31. Colorado, 4, 10, 13, 14, 16, 22, 23, 24, 25, 30, 31. Connecticut, 4, 30. Idaho, 1, 13, 14. Illinois, 17, 19, 25, 27, 28, 29. Indiana, 25, 26, 29. Iowa, 18, 19, 27, 29. Kansas, 5, 19, 24, 28, 29, 30. Kentucky, 20, 30. Maine, 28. Maryland, 4. Massachusetts, 4, 21, 29, 30. Michigan, 3, 6, 28, 29, 30. Minnesota, 1, 3, 5, 19, 23, 24, 26, 29. Missouri, 25, 27, 28, 29, 30. Montana, 16, 18, 22, 25, 29, 30. Nebraska, 3, 19, 25, 28, 29, 30. New Hampshire, 2, 21. New Jersey, 4, 9, 31. New Mexico, 2, 7, 8, 9, 15, 16, 17, 19, 27, 29, 31. New York, 4, 10. North Carolina, 4. North Dakota, 5, 21, 23, 26. Ohio, 3, 24, 28, 30. Oregon, 11, 13. Pennsylvania, 4, 9, 22. South Dakota, 5, 6, 7, 17, 21, 22, 23, 26, 27, 29. Tennessee, 12. Texas, 24. Vermont, 19. Virginia, 9, 20. Wisconsin, 8, 10, 12, 13, 16, 18, 19, 30, 31. Wyoming, 8, 10, 12, 13, 16, 30.

Hail was reported on the greatest number of dates in Colorado and New Mexico, 11 each; Wisconsin, 9; and Minnesota, 8. There appears to have been less hail than during the preceding month.

HUMIDITY.

The humidity observations of the Weather Bureau are divided into two series; the first or tridaily series began in 1871 and ended with 1887; the second or twice-daily series is continuous from 1888 to the present time.

The monthly means of the second or present series are based upon observations of the whirled psychrometer at 8 a. m. and 8 p. m., seventy-fifth meridian time, which corresponds to 5 a. m. and 5 p. m., Pacific; 6 a. m. and 6 p. m., Mountain; and 7 a. m. and 7 p. m., Central standard time.

Mean values computed from the first series are naturally not directly comparable with those of the second. In general the means of the first series are lower than those of the second, since they include an observation in the afternoon when the relative humidity of the air is near the minimum of the day. At stations in the western plateau region, however, the converse holds good, the means of the second series being lower than those of the first by amounts ranging from 0 to 10 per cent on the average of the year.

In the present state of knowledge respecting the diurnal variation in the moisture of the air, we are scarcely warranted in combining the two series in a general mean.

The current month.—The average relative humidity by geographic districts and the departures from the normal are shown in the subjoined table. The greatest departures from normal values occurred on the Pacific coast, the southern slope, and the Middle Atlantic States. In the last-named

district the first part of the month was hot, but not unusually humid. The closing part of the month was unusually humid, as has been shown in the section on temperature. The greatest humidity of the month was 93 per cent, at Fort Canby, Wash.; the least, 17 per cent, at Independence, Cal.

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	81	+2	Missouri Valley	67	0
Middle Atlantic	76	+4	Northern Slope	51	-1
South Atlantic	82	+1	Middle Slope	62	+1
Florida Peninsula	79	+2	Southern Slope	63	+4
East Gulf	79	0	Southern Plateau	41	-1
West Gulf	75	+2	Middle Plateau	34	+2
Ohio Valley and Tennessee	71	+2	Northern Plateau	43	0
Lower Lake	67	-1	North Pacific Coast	71	-6
Upper Lake	71	0	Middle Pacific Coast	62	-5
North Dakota	66	0	South Pacific Coast	62	-1
Upper Mississippi Valley	67	-1			

In using the table by means of which the amount of moisture in the air is computed from the readings of the wet and dry bulb thermometers, the pressure argument has almost always been neglected, an omission that has little significance except for low temperatures and at high stations, such as Santa Fe, El Paso, Cheyenne, and a few others. The failure to apply a correction for the influence of the prevailing pressure on the psychrometer has the effect of making the monthly means of relative humidity at high-level stations too small by quantities ranging from 5 to 10 per cent. In the application of the monthly averages of the above table, or those of individual stations in Table I, to special inquiries, whether in the departments of biology, climatology, or sanitary science, this fact should be kept in mind. It should also be remembered that the hours at which observations in the Rocky Mountain Plateau region are made, viz, at 5 or 6 local mean time, morning and afternoon, give approximately the maximum and minimum values of the relative humidity for the day; probably the means of such hours approach more nearly the true mean of the month than is the case on the Atlantic seaboard and in the seventy-fifth meridian time belt.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 21 regular stations of the Weather Bureau by its photographic and at 47 by its thermal effects. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table IX for each hour of local mean time. In order to complete the record of the duration of cloudiness these registers are supplemented by special personal observations of the state of the sky near the sun for an hour after sunrise and before sunset, and the cloudiness for these hours has been added as a correction to the instrumental records, whence there results a complete record of the duration of sunshine from sunrise to sunset.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table IX for the stations at which instrumental self-registers are maintained.

The percentage of clear sky (sunshine) for all of the sta-

tions included in Table I, obtained as described in the preceding paragraph, is graphically shown on Chart VII. The regions of cloudy and overcast skies are shown by heavy shading; an absence of shading indicates, of course, the prevalence of clear, sunshiny weather.

The formation of fog and cloud is primarily due to differences of temperature in a relatively thin layer of air next to the earth's surface. The relative position of land and water surfaces often greatly increases the tendency to form areas of cloud and fog. This principle is perhaps better exemplified in the Lake region than elsewhere, although it is of quite general application. The percentage of sunshine on the lee shores of the Lakes is always much less than on the windward shores. Next to the permanent influences that tend to form fog and cloud may be classed the frequency of the passage of cyclonic areas.

The current month.—The month was one of less cloudiness and consequently of greater sunshine than usual, except on the immediate Pacific coast and in the South Atlantic States. The regions of least sunshine during the current month, strangely enough, were central Alabama, northwestern Georgia and on the immediate Pacific coast. The regions of the greatest sunshine were in the great valley of California and the Southwest, although the summer rains of Arizona and New Mexico diminished the sunshine of that region from what it was during the preceding month. At Santa Fe there was but 37 per cent of sunshine; at Red Bluff there was 99 per cent, or practically continuous sunshine.

Averages and departures by districts are given in the table below:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.5	+0.6	Missouri Valley	4.0	-0.4
Middle Atlantic	5.2	+0.4	Northern Slope	3.7	-0.1
South Atlantic	5.8	+0.8	Middle Slope	3.7	-0.3
Florida Peninsula	4.4	-0.6	Southern Slope	3.6	-0.2
East Gulf	5.4	+0.4	Southern Plateau	3.5	+0.2
West Gulf	4.7	+0.5	Middle Plateau	2.1	+0.1
Ohio Valley and Tennessee	5.0	+0.4	Northern Plateau	2.5	+0.6
Lower Lake	4.2	-0.3	North Pacific Coast	3.4	-1.0
Upper Lake	3.8	-0.9	Middle Pacific Coast	2.8	-0.1
North Dakota	3.7	-0.6	South Pacific Coast	2.0	-0.7
Upper Mississippi Valley	3.7	-0.6			

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Amarillo, Tex	28	54	n.	Cleveland, Ohio	20	52	w.
Atlanta, Ga	27	52	sw.	Dubuque, Iowa	19	56	nw.
Atlantic City, N. J.	13	50	ne.	Huron, S. Dak	5	58	s.
Block Island, R. I.	13	60	ne.	Kansas City, Mo	27	50	nw.
Fort Canby, Wash	16	50	se.	Marquette, Mich	19	52	sw.

LOCAL STORMS.

The severest storm of the month occurred in Lafayette and Johnson counties, Mo., on the evening of the 29th. More than 100 buildings were destroyed in its course of about 25

miles, and 18 persons were injured, 2 of whom have since died. The storm was first observed in the vicinity of Odessa, Lafayette County. It was not severe at first, but as it moved southeastward, spreading out in fan shape, several funnel clouds, each with its system of whirling winds, seemed to develop. Ordinarily, tornado clouds move from the southwest to the northeast, but in this case the movement was from the northwest to the southeast, parallel to and in the midst of the general thunderstorm cloud. The latter, when last observed, had a width of about 12 miles. Earlier in the day a severe tornado was observed in the southeastern part of Buchanan County, about 40 miles northwest of Odessa. In this case the resultant direction was also southeast.

The month brought with it the usual number of local squall winds and thunderstorms, only the most severe of which are noted in the list below:

2d.—Batesville, Ark.: A storm of wind and rain struck the town at 6 p. m. Shade trees, roofs, and porches were demolished. The end of a brick office building was torn out, the debris falling upon and killing one person and severely injuring another; property loss, \$2,500.

4th.—Hampton Beach, N. H., and Longbeach, Queens County, N. Y. A severe local whirlwind or minor tornado struck both places on the afternoon of the 4th. At the first named place about 20 cottages were more or less injured and a skating rink, where a number of people had congregated, was badly wrecked; 5 persons were killed at the rink and many others severely injured. A pleasure yacht that happened to be in the course of the storm as it passed out to sea was capsized and 5 persons were drowned. The Longbeach storm seems to have been an overgrown whirlwind that had power enough to lift a frame building two and one-half stories in height, 120 feet long and 30 feet wide, from its foundation; the building was moved about 40 feet by the wind and badly wrecked; 8 colored waiters were injured in the wreck; property loss about \$6,000.

11th.—The Missouri Valley Journal of July 14 reports the destruction of a store building, barn, and sheds by tornado west of Chamberlain, S. Dak., on the 11th. The report can not be verified.

18th.—A tornado occurred near Warrenton and Norwood, Ga., 4:30 p. m., central time; 1 person killed, 2 injured; property loss, \$3,000; path from 50 to 200 yards wide; length, 12 miles; moved a little west of north.

15th.—A severe windstorm damaged, and in some cases, destroyed roofs of buildings and fences in Gila Bend, Ariz.

17th.—Globe, Ariz., was visited by a windstorm severe enough to wreck two partially completed buildings, and 2 persons were injured by the debris.

19th.—Central and eastern Iowa, northern Illinois, southern Wisconsin, and portions of Michigan were visited by severe squall winds and thunderstorms on the afternoon and evening of the 19th. Barns, fences, windmills, and other farm property suffered damage. The loss in individual cases was generally small, but in the aggregate a large loss must have been sustained.

21st.—Severe thunderstorms were experienced in eastern Pennsylvania, New Jersey, and New England in the evening of this date. Thirteen dwellings, 12 barns, and 1 church were struck by lightning in New Jersey.

Seventeen buildings were partially wrecked and 7 persons injured at Minot, N. Dak., on the same date. The storm moved from northwest to southeast; property loss, \$5,000. Probably a straight wind.

27th.—A small tornado having its origin near Hastings, Mills County, Iowa, moved eastward in a narrow path, lifting at intervals, and finally disappearing west of Redoak, Montgomery County, Iowa. Length of path, about 15 miles; 2 persons were killed and 3 injured; property loss, \$10,000 to

\$12,000. Many funnel clouds were observed, all being very destructive whenever they touched the earth.

Severe local storms occurred elsewhere in Iowa, also in Indiana, Illinois, Michigan, Missouri, and New Mexico.

29th.—Two sections of northwestern Missouri were visited by severe local storms and tornadoes on the afternoon and evening of this date. The first storm had its origin near Faucett, Buchanan County. It moved eastward and then southeastward, disappearing in the vicinity of Gower, Clinton County, about 10 miles from its origin. This tornado was very destructive. Two persons were severely injured, and many escaped injury and possibly death by taking refuge in tornado caves. The Democrat-Lever, of Gower, places the property loss at \$75,000.

The second storm was first observed at Odessa, Lafayette County, Mo., whence it moved to the southeast, increasing in violence and spreading out in the shape of a fan as it advanced. At Tabo, 8 miles southeast of Odessa, two funnel clouds were observed moving, it was said, to the northeast. At Hoffman, a few miles south of Tabo, the funnel cloud was reported as moving from the northwest to the southeast, and the same direction was observed at Knobnoster, about 17 miles southeast of Tabo. Eighteen persons were injured, two of them having since died. The property loss was estimated at amounts varying from \$50,000 to \$100,000. Probably \$75,000 is not far from the true figure. Seventy-five buildings were totally or partially demolished at Knobnoster, 36 north of and in the immediate vicinity of Fayetteville, and 2 at Odessa.

30th–31st.—Severe thunderstorms and torrential rains occurred in various parts of New England.

WATERSPOUT.

In the Marine Record of July 28 there is an account of a waterspout seen off Sturgeon Bay, Lake Michigan. The date of the spout is not given. The Editor hopes that any one knowing the date will send it to the Chief of the Weather Bureau, Washington, D. C. The account of the spout given by the captain of the steamer *Otis* is as follows:

A few moments after the storm struck us we could see the water rise upward, about a quarter of a mile leeward of us, in a whirling column until it was at least 100 feet high. It was funnel-shaped and must have been 30 feet wide at the bottom, the top tapering and hanging over to one side. Above were hungry-looking clouds, through which the lightning darted. The waterspout lasted about twenty-five minutes, when the water gradually subsided. The storm was a furious one for a while, but we rode through it successfully.

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IX, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Five thousand seven hundred and thirteen reports of thunderstorms were received during the current month as against 5,376 in 1897, and 5,455 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 19th, 436; 30th, 300; 29th, 293; 25th, 280; 4th, 269.

Reports were most numerous from Ohio, 360; Missouri, 298; Colorado, 277; Florida, 258. Thunderstorms occurred in Florida and New Mexico on every day of the month, and in Colorado on every day except one, the 28th. There were 12 thunderstorms reported in California, 32 in Oregon, and 26 in Washington.

Auroras.—The evenings on which bright moonlight must

have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from June 29 to July 7.

The greatest number of reports were received for the following dates: 19th, 11, and 21st, 10.

Reports were most numerous from Ohio, 10; Minnesota, 9.

In Canada.—Auroras were reported as follows: Father Point, 17, 21, 22; Quebec, 5, 6, 21, 22; Montreal, 21; Toronto, 6, 19; Winnipeg, 20; Minnedosa, 13, 17, 19, 20, 21, 22, 23, 24, 25; Qu'Appelle, 19, 20, 21; Banff, 6, 24; Prince Albert, 19, 20, 22, 23.

Thunderstorms were reported as follows: Halifax, 1; Grand Manan, 4, 24; Yarmouth, 4, 5, 9, 15; Charlottetown, 3; Chatham, 3; Father Point, 2, 3, 8, 25, 29; Quebec, 3, 10, 20, 21, 23, 25, 29, 30; Montreal, 3, 8, 18, 19, 20, 23, 25; Rockliffe, 19; Toronto, 3, 8, 17, 19, 25, 28; White River, 2, 7, 8, 14, 17, 18, 20, 23, 28; Port Stanley, 3, 8, 25, 30; Parry Sound, 8, 28; Port Arthur, 2, 5, 6, 7, 14, 22, 27; Winnipeg, 3, 5, 6, 11, 14, 18, 27; Minnedosa, 4, 5, 11, 12, 14, 17, 24, 26; Qu'Appelle, 17; Medicine Hat, 12, 30; Swift Current, 2, 8, 10, 13, 16, 23, 27, 29; Banff, 12, 13, 16, 25; Prince Albert, 1, 5, 17, 29; Bermuda, 24.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Rainfall is expressed in inches.

Alabama.—The mean temperature was 80.0°, or about normal; the highest was 103°, at Hamilton on the 1st, and the lowest, 51°, at Madison on the 12th. The average precipitation was 6.06, or 1.13 above normal; the greatest monthly amount, 11.27, occurred at Eufaula, and the least, 3.95, at Tusculumbia.—*F. P. Chaffee.*

Arizona.—The mean temperature was 83.5°; the highest was 123°, at Fort Mohave on the 28th, and the lowest, 40°, at Prescott on the 19th. The average precipitation was 2.44; the greatest monthly amount, 8.86, occurred at Bisbee, while none fell at Fort Mohave and Yuma.—*W. T. Blythe.*

Arkansas.—The mean temperature was 79.9°, or about normal; the highest was 105°, at Conway on the 22d, and the lowest, 50°, at Fayetteville on the 12th and 13th, and at Oregon on the 11th. The average precipitation was 4.25, or 0.38 below normal; the greatest monthly amount, 13.97, occurred at Pond, and the least, 0.60, at Texarkana.—*E. B. Richards.*

California.—The mean temperature was 81.4°, or about normal; the highest was 124°, at Volcano Springs on the 13th, and the lowest, 27°, at Bodie on the 2d and 25th. The average precipitation was less than 0.01, or 0.04 below normal; the greatest monthly amount, 0.22, occurred at San Jacinto, while no rain fell at more than half of the stations.—*W. H. Hummon.*

Colorado.—The mean temperature was 67.7°, or about 1.0° above normal; the highest was 109°, at Fort Morgan on the 18th, and the lowest, 29°, at Steamboat Springs on the 23d, 29th, and 30th. The average precipitation was 2.14, or 0.07 below normal; the greatest monthly amount, 4.75, occurred at Altman, while none fell at Steamboat Springs.—*F. H. Brandenburg.*

Georgia.—The mean temperature was 79.8°, or nearly normal; the highest was 104°, at Millen on the 1st, and the lowest, 47°, at Diamond on the 12th. The average precipitation was 8.14, or 2.32 above normal; the greatest monthly amount, 15.45, occurred at Leverett, and the least, 4.31, at Americus.—*J. B. Morbury.*

Idaho.—The mean temperature was 66.6°; the highest was 105°, at Nampa on the 11th, and the lowest, 28°, at Gray on the 2d, and at Marysville on the 17th. The average precipitation was 0.39; the greatest monthly amount, 2.00, occurred at American Falls, and the least, trace, at Nampa.—*D. P. McCallum.*

Illinois.—The mean temperature was 75.5°, or about normal; the highest was 102°, at Alexander on the 24th, and the lowest, 41°, at Lanark on the 11th. The average precipitation was 2.93, or 0.82 below normal; the greatest monthly amount, 7.52, occurred at St. John, and the least, 0.29, at Dwight.—*C. E. Linney.*

Indiana.—The mean temperature was 76.4°, or 1.5° above normal; the highest was 102°, at Bright on the 3d, at Salem on the 24th, and at Winamac on the 26th; the lowest was 42°, at Bluffton and Cambridge City on the 11th, and at Winamac on the 10th and 11th. The average precipitation was 3.02, or 0.30 below normal; the greatest monthly amount, 5.55, occurred at Vevay, and the least, trace, at Bedford.—*C. F. R. Wappenhans.*

Iowa.—The mean temperature was 73.4°, or about normal; the highest was 102°, at Clarinda on the 19th, and at Rock Rapids on the 24th, and the lowest, 42°, at Ames on the 11th, and at Neola on the 31st. The average precipitation was 2.98, or slightly below normal; the greatest monthly amount, 12.88, occurred at Thurman, and the least, 0.55, at Pioneer.—*G. M. Chappel.*

Kansas.—The mean temperature was 77.7°, or 0.6° below normal;

the highest was 108°, at Hays and Russell on the 27th, and the lowest, 46° at Hoxie on the 18th. The average precipitation was 3.00, or 0.31 below normal; the greatest monthly amount, 6.80, occurred at Oswego, and the least, 0.38, at Gibson.—*T. B. Jennings.*

Kentucky.—The mean temperature was 77.8°, or 0.9° above normal; the highest was 102°, at Russellville and Williamsburg on the 2d, at Shelby City on the 3d, and at Maysville on the 4th; the lowest was 48°, at Loretto on the 11th, and at Maysville on the 12th. The average precipitation was 4.71, or 0.14 above normal; the greatest monthly amount, 12.10, occurred at Vanceburg, and the least, 0.44 at Irvington.—*G. E. Hunt.*

Louisiana.—The mean temperature was 80.9°, or 0.8° below normal; the highest was 103°, at Liberty Hill on the 21st, and the lowest, 55°, at Robeline on the 14th. The average precipitation was 5.84, or 1.21 above normal; the greatest monthly amount, 11.99, occurred at Clinton, and the least, 2.94, at Plain Dealing.—*E. A. Beals.*

Maryland and Delaware.—The mean temperature was 77.5°, or 2.1° above normal; the highest was 109°, at Boettcherville, Md., on the 3d, and the lowest, 33°, at Deepark, Md., on the 11th. The average precipitation was 3.65, or 0.80 below normal; the greatest monthly amount, 7.77, occurred at Grantsville, Md., and the least, 1.31, at Cumberland, Md.—*F. J. Walz.*

Michigan.—The mean temperature was 69.9°, or 1.2° above normal; the highest was 101°, at Clinton and Mottville on the 24th, and the lowest, 25°, at Baldwin on the 11th. The average precipitation was 1.57, or 1.02 below normal; the greatest monthly amount, 4.55, occurred at St. Ignace, and the least, 0.15, at Fitchburg.—*C. F. Schneider.*

Minnesota.—The mean temperature was 69.8°, or about normal; the highest was 101°, at Wabasha on the 24th, and the lowest, 38°, at Mount Iron on the 6th, at Koochiching on the 10th, and at Folden on the 18th. The average precipitation was 2.94, or about 0.50 below normal; the greatest monthly amount, 9.40, occurred at Beardsley.—*T. S. Outram.*

Mississippi.—The mean temperature was 80.5°, or 0.8° below normal; the highest was 104°, at Columbus on the 22d, and the lowest, 53°, at French Camp on the 13th. The average precipitation was 5.92, or 2.08 above normal; the greatest monthly amount, 12.91, occurred at Walnutgrove, and the least, 1.57, at Greenville.—*R. J. Hyatt.*

Missouri.—The mean temperature was 76.1°, or 0.5° below normal; the highest was 104°, at Princeton on the 24th, and the lowest, 42°, at Potosi on the 12th. The average precipitation was 5.58, or 1.03 above normal; the greatest monthly amount, 15.06, occurred at Edgehill, and the least, 1.97, at Unionville.—*A. E. Hackett.*

Montana.—The mean temperature was 66.0°, or about 1.0° below normal; the highest was 104°, at Fort Keogh on the 26th, and the lowest, 31°, at Castle on the 2d. The average precipitation was 0.58 above normal; the greatest monthly amount, 3.32, occurred at Yale, and the least, 0.40, at Glendive and Radersburg.—*E. J. Glass.*

Nebraska.—The mean temperature was 74.0°, or more than 1.0° below normal; the highest was 108°, at Bluehill on the 24th, and the lowest, 35°, at Gering on the 5th. The average precipitation was 2.12, or about 1.40 below normal; the greatest monthly amount, 11.53, occurred at Plattsmouth, and the least, trace, at Fairmont and Valparaiso.—*G. A. Loveland.*

Nevada.—The mean temperature was 73.5°, or 0.6° below normal; the highest was 114°, at St. Thomas on the 28th, and the lowest, 34°, at Elko on the 1st. The average precipitation was 0.12, or about half the usual amount; the greatest monthly amount, 0.96, occurred at Panaca, while none fell at many stations.—*R. F. Young.*

New England.—The mean temperature was 70.0°, or 1.2° above normal; the highest was 103°, at Middletown, Conn., on the 3d, and the lowest, 30°, at Flagstaff, Me., on the 12th. The average precipitation was 3.85, or 0.52 above normal; the greatest monthly amount, 10.26, occurred at Providence, R. I., and the least, 0.66, at Eastport, Me.—*J. W. Smith.*